

WHAT IS CLAIMED IS:

1. An apparatus for selectively coupling fiber optic lines comprising:
- (a) an optical input selection device rotatable about a first central axis and comprising a first input end disposed collinearly with the first central axis and a first output end disposed at a radially offset distance from the first central axis;
- (b) an optical output selection device rotatable about a second central axis and comprising a second input end disposed at a radially offset distance from the second central axis and a second output end disposed collinearly with the second central axis; and
- (c) a rotatable coupling mechanism interconnecting the optical input selection device and the optical output selection device.
- 5
- 10
- 15
- 20
- 25
- 30
2. The apparatus according to claim 1, comprising a plurality of fiber-optic source lines and a plurality of fiber-optic return lines, wherein the plurality of source lines have respective source line input ends fixedly disposed in a circular arrangement, the plurality of return lines have respective return line output ends fixedly disposed in a circular arrangement, each source line input end is selectively optically alignable with the first output end of the optical input selection device through incremental rotation of the optical input selection device, and each return line output end is selectively optically alignable with the second input end of the optical output selection device through incremental rotation of the optical output selection device.
3. The apparatus according to claim 1, wherein the optical input selection device comprises:
- (a) a first rotary element rotatable about the first central axis, the first rotary element comprising a first input surface and an opposing first output surface, wherein the first input end is exposed at the first input surface and the first output end is exposed at the first output surface; and
- (b) a first stationary element disposed adjacent to the first output surface and having a plurality of circumferentially spaced first stationary element apertures, wherein each first stationary element aperture is disposed at the radially offset distance from the first central axis, and the first output end is alignable with a selected one of the first stationary element apertures through rotation of the first rotary element.

4. The apparatus according to claim 3, wherein the first stationary element includes a first annular section coaxially disposed around the first rotary element.

5. The apparatus according to claim 4, wherein the optical input selection device comprises a first bearing coaxially interposed between the first rotary element and the first annular section.

6. The apparatus according to claim 3, wherein the optical output selection device comprises:

10 (a) a second rotary element rotatable about the second central axis, the second rotary element comprising a second input surface and an opposing second output surface, wherein the second input end is exposed at the second input surface and the second output end is exposed at the second output surface; and

15 (b) a second stationary element disposed adjacent to the second input surface and having a plurality of circumferentially spaced second stationary element apertures, wherein each second stationary element aperture is disposed at the radially offset distance from the second central axis, and the second input end is alignable with a selected one of the second stationary element apertures through rotation of the second rotary element.

20

7. The apparatus according to claim 6, wherein the first stationary element includes a first annular section coaxially disposed around the first rotary element, the second stationary element includes a second annular section coaxially disposed around the second rotary element, the optical input selection device includes a first bearing coaxially interposed between the first rotary element and the first annular section, and the optical output selection device includes a second bearing coaxially interposed between the second rotary element and the second annular section.

25

8. The apparatus according to claim 1, wherein the optical output selection device comprises:

30 (a) a second rotary element rotatable about the second central axis, the second rotary element comprising a second input surface and an opposing second output surface, wherein the second input end is exposed at the second input surface and

the second output end is exposed at the second output surface; and
5 (b) a second stationary element disposed adjacent to the second input surface and having a plurality of circumferentially spaced second stationary element apertures, wherein each second stationary element aperture is disposed at the radially offset distance from the second central axis, and the second input end is alignable with a selected one of the second stationary element apertures through rotation of the second rotary element.

9. The apparatus according to claim 1, wherein the optical input selection device comprises an internal optical fiber defining an optical path between the first input end and the first output end.
10. The apparatus according to claim 1, wherein the optical output selection device comprises an internal optical fiber defining an optical path between the second input end and the second output end.
15. The apparatus according to claim 1, wherein the optical input selection device comprises a first internal optical fiber defining a first optical path between the first input end and the first output end, and the optical output selection device comprises a second internal optical fiber defining a second optical path between the second input end and the second output end.
20. An apparatus for routing optical signals comprising:
25 (a) a base;
(b) an optical channel selection device supported by the base and rotatable about a central axis, the optical channel selection device comprising an internal optical fiber having an internal optical fiber input end and an internal optical fiber output end, the internal optical fiber input end disposed collinearly with the central axis and the internal optical fiber output end disposed at a radially offset distance from the central axis;
- 30 (c) a mounting member supported by the base; and
(d) a plurality of fiber-optic return lines, each return line having a return line output end fixedly supported by the mounting member.

- 5
10
15
20
25
30
13. The apparatus according to claim 12, comprising a plurality of fiber-optic source lines having respective source line input ends fixedly disposed in a circular arrangement, wherein each source line input end is selectively optically alignable with the internal optical fiber output end of the optical channel selection device through incremental rotation of the optical channel selection device.
14. The apparatus according to claim 12, wherein the optical channel selection device comprises:
- a rotary element rotatable about the central axis, the rotary element comprising an input end surface and an opposing output end surface, wherein the internal optical fiber input end is exposed at the input end surface and the internal optical fiber output end is exposed at the output end surface; and
 - a first stationary element disposed adjacent to the output end surface and having a plurality of circumferentially spaced first stationary element apertures, wherein each first stationary element aperture is disposed at the radially offset distance from the central axis, and the internal optical fiber output end is alignable with a selected one of the first stationary element apertures through rotation of the rotary element.
15. The apparatus according to claim 14, wherein the first stationary element includes a first annular section coaxially disposed around the rotary element.
16. The apparatus according to claim 15, wherein the optical channel selection device comprises a first bearing coaxially interposed between the rotary element and the first annular section.
17. The apparatus according to claim 14, comprising a second stationary element disposed adjacent to the input end surface, the second stationary element having a second aperture axially adjacent to the input end surface in alignment with the internal optical fiber input end.
18. The apparatus according to claim 12, comprising a light source communicating with the internal optical fiber input end.

19. The apparatus according to claim 18, comprising an optical receiving device aligned with each return line output end.

20. The apparatus according to claim 19, comprising a plurality of sample test sites, each 5 sample test site optically communicating with the internal optical fiber end of the optical channel selection device at a selected rotary index position thereof and one of the optical return lines corresponding to the selected rotary index position.

21. The apparatus according to claim 12, comprising an optical receiving device aligned with 10 each return line output end.

22. The apparatus according to claim 12, comprising a plurality of sample test sites, each 15 sample test site optically communicating with the internal optical fiber end of the optical channel selection device at a selected rotary index position thereof and one of the optical return lines corresponding to the selected rotary index position.

23. A method for selecting an optical channel from a plurality of optical channels, comprising the steps of:

- (a) providing an optical channel selecting apparatus comprising an input selection 20 device including a first input end and a first output end, an output selection device including a second input end and a second output end, and a coupling mechanism interconnecting the input selection device and the output selection device, wherein the input selection device provides an input path between the first input end and the first output end, and the output selection device provides an output path between the second input end and the second output end; and
- (b) causing the optical channel selecting apparatus to select a first channel by causing 25 the coupling mechanism to move the first output end to a first input position and the second input end to a first output position.

30 24. A method for selecting an optical channel from a plurality of optical channels, comprising the steps of:

- (a) providing an input selection device comprising an input end, an output end, and an input path defined between the input end and the output end;

- (b) providing a plurality of optical return fibers having respective fiber ends disposed at a distance from an optical receiving device; and
 - (c) selecting a first channel by causing the input selection device to rotate the output end to a first position at which the input path is optically coupled with a respective return fiber.
- 5